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(71)Applicant : ASAHI CHEM IND CO LTD

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(72)Inventor : YASUGATA KOICHI

(54) HOMOGENEOUS MICROPOROUS FILM MADE OF ULTRAHIGH-MOLECULAR WEIGHT POLYETHYLENE AND ITS PRODUCTION

(57)Abstract:

PURPOSE: To obtain the subject microporous film having a high strength and a moderate pore diameter by kneading and melting a mixture of ultrahigh-molecular weight polyethylene with inorganic fine powder and a specific plasticizer, molding the mixture into a sheetlike shape, extracting and removing the additives, drying the sheet and uniaxially drawing the dried sheet.

CONSTITUTION: A mixture of ultrahigh-molecular weight polyethylene having ≥ 2000000 viscosity-average molecular weight with inorganic fine powder and a plasticizer is molded into a sheetlike form while being kneaded and thermally melted. The inorganic fine powder and the plasticizer are respectively extracted and removed and the resultant sheet is dried and then drawn only in one axial direction to produce a microporous film. In the process, a mixed plasticizer of two kinds having 7.5-8.4 SP value and 8.5-9.5 SP value of plasticizers is used and the plasticizer having the 7.5-8.4 SP value is used in an amount of 10-150% based on the weight of the polyethylene to afford the objective microporous film having $\geq 40\%$ porosity, $\leq 450\text{sec}/100\text{cc}$ air permeability, $\geq 4000\text{kg}/\text{cm}^2$ modulus of elasticity in the machine direction, $\geq 400\%$ breaking elongation in the direction perpendicular to the machine direction, 2-10kg/cm² bubble point in ethyl alcohol and ≤ 1.6 ratio of the maximum pore diameter to the average pore diameter.

LEGAL STATUS

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CLAIMS

[Claim(s)]

[Claim 1] the fine porous membrane which has the three-dimensional network which viscosity average molecular weight becomes from the ultra high molecular weight polyethylene which is 2 million or more -- it is -- porosity -- 40% or more and air permeability -- the elastic modulus of 450sec(s) / 100 cc or less, and the direction of a machine -- 4000kg/cm² a bubble point [in / the above / in whenever / breaking extension / of the direction of a machine, and the direction of a right angle / 400% or more and ethyl alcohol] -- 2kg/cm² - 10kg/cm² it is -- homogeneous fine porous membrane [claim 2] made from ultra high molecular weight polyethylene to the ratio of an average aperture and the maximum aperture be characterized by being 1.6 or less While viscosity average molecular weight carries out kneading / heating fusion of the mixture of the ultra high molecular weight polyethylene which is 2 million or more, non-subtlety fine particles, and a plasticizer, after fabricating in the shape of a sheet, In the manufacture approach of extract-removing, and drying non-subtlety fine particles and a plasticizer, respectively, extending only to 1 shaft orientations, and obtaining fine porous membrane SP value of this plasticizer uses at least two kinds of mixed plasticizers of 7.5-8.4, and 8.5-9.5. And SP value is characterized by the amount of plasticizers of 7.5-8.4 being this 10% - 150% of polyethylene weight. For 40% or more and air permeability, the elastic modulus of 450sec(s) / 100 cc or less, and the direction of a machine is [porosity] 4000kg/cm². Above, a bubble point [in /, in whenever / breaking extension / of the direction of a machine and the direction of a right angle / 400% or more and ethyl alcohol] -- 2kg/cm² - 10kg/cm² it is -- the manufacture approach of the homogeneous fine porous membrane made from ultra high molecular weight polyethylene that the ratio of an average aperture and the maximum aperture is 1.6 or less

[Translation done.]